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ANNUAL REPORT

FOR

1989

LABORATORY GRADUATE FELLOWSHIP PROGRAM

F49620-86-C-0127

PROGRAM MANAGER, AFOSR
Lt. Col. Claude Cavender

PROGRAM DIRECTOR, UES
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Prepared For:

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Washington, DC

Submitted By:

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Dayton, OH

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I. INTRODUCTION

Critical to the success of the Air Force Office of Scientific Research (AFOSR) mission is the ability of AFOSR to draw upon the research community in the United States to respond to its needs. In recent years, however, the number of U. S. citizens seeking advanced degrees in the areas of Air Force research interests has been decreasing. This refers specifically to the number of U. S. citizens obtaining Ph.D. degrees in areas of mathematics and science that are of interest to the Air Force. This situation points toward the potential problem of a future shortage of qualified researchers in areas critical to the nation's security interest.

To address this problem, the United States Air Force Laboratory Graduate Fellowship Program (USAF/LGFP) was established. The contract is funded under the Air Force Systems Command by the AFOSR. The program annually provides three-year fellowships for at least 25 Ph.D. students in research areas of interest to the Air Force. Universal Energy Systems, Inc. (UES) has completed the third year of the three-year LGF program contract.

This report, prepared in compliance with contractual requirements, covers the third year of the program which now sponsors 27 first-year participants as well as 25 second-year fellows and 22 third year fellows for a total of 74 active fellowships. The report addresses an overview of the administration tasks, statistics on the 1989 awards, profiles of all the fellows, and summarized results of the evaluation process. Materials deemed inappropriate for inclusion in the main body of the report, such as samples of forms, complete questionnaire results, etc., are included in the appendices.

II. ADMINISTRATION

The administration of the LGF program is conducted from the Dayton offices of UES. The staff consists of Mr. Rodney C. Darrah, Program Manager; Ms. Judy Conover, Program Administrator; and support personnel. Most members of the 1989 program administration team have been involved with the project since award of the contract to UES. This element of an experienced, stable staff ensures program continuity and contributes to successful operation of administrative tasks.

The primary tasks in managing the program consist of advertising (which includes compiling and updating a mailing list, and preparing and distributing ads, flyers, and

brochures); selecting candidates (which involves screening, coordinating with labs, and notifying recipients; coordinating the handling of payments through subcontract agreements with the universities; evaluating the program via questionnaires; and reporting results to AFOSR.

The Laboratory Graduate Fellowship Program is advertised nationally and fellowships are awarded on a competitive basis. For the 1989 LGFP, as in the previous year, UES focused on two approaches in conducting the LGFP advertising campaign: (1) professional journals, and (2) direct mailing.

UES advertised the USAF/LGFP in nationally distributed professional journals. To target the greatest number of potential applicants for the cost, the following journals were chosen to carry ads of the program: IEEE Spectrum, Physics Today, Chemical Engineering News, Science, and Black Issues In Higher Education. A copy of the half-page advertisement that appeared in these publications is shown in Appendix A, Exhibit A-1.

The mailing list for direct mailing of promotional materials was comprised of all accredited universities and colleges in the United States and provinces, requests received by UES, and the names of former applicants. The list is maintained in a database (Dbase IV) and is updated throughout the program. The identification of the university departments to which the mailing was addressed was based on a list of research areas provided by the laboratories. Also targeted were specific departments in charge of grants and fellowships at the academic institutions canvassed. The departments included aeronautical engineering, behavioral science, biology, biomedical engineering, biophysics, chemical engineering, chemistry, civil engineering, computer science, electrical engineering, engineering, geophysics, industrial engineering, life science, mathematics, mechanical engineering, meteorology, metallurgy, and physics.

Both flyers and brochures were prepared by UES for this advertising effort. The one-page flyer, appropriate for posting on bulletin boards, provided both an 800 telephone number at UES as well as convenient forms to use in requesting additional information about the program. The availability of an 800 number expedited the application process and offered a more personal communication for the applicant. UES employees who are

familiar with the program were assigned to respond to phone requests and assist the potential applicants at this stage of the program.

The four-page brochure gave additional information on the background and objective of the program, requirements for application, duration of the fellowship, stipends, conditions of the appointment, etc. It also listed all the participating Air Force Laboratories.

The flyer and brochure are both full size, printed in three colors on glossy paper. The promotional materials were designed to reflect the high quality of the program and yet be produced at relatively low cost. Samples of the flyer and brochure are included in Appendix A, Exhibits A-2 and A-3. Approximately 17,000 brochures and flyers were distributed throughout the U.S. and provinces.

In the first stage of the selection process, UES reviewed the applications for completeness of the packages. A complete application consists of a signed Personal Information Form, undergraduate and graduate transcripts, Graduate Record Examination results (general test only), and three letters of recommendation. (See Appendix A, Exhibit A-4 for a copy of the Application Form.) Upon receipt, all complete applications were processed and entered into a Dbase III file.

Applications were then evaluated. The following criteria were applied to the evaluation process:

(1) The proposed Ph.D. study must be in an area of Air Force interest;

(2) Academic records;

(3) Recommendations from faculty;

(4) Graduate Record Examination scores.

After completing the initial screening, UES provided the Laboratory Focal Point with a list of all applicants who had requested that laboratory as their first choice, along with the applications of those who met the GPA qualification and other criteria applied to the initial screening. At this stage of the selection process, the laboratory representatives were responsible for evaluating the qualified applicants. Using its own selection criteria which were in compliance with the above, each laboratory prioritized the list of candidates, and sent these recommendations to UES. Based on the laboratories'

recommendations and the selection criteria cited above, UES completed the selection process. The final choices were then subject to approval by AFOSR.

Upon approval by AFOSR, UES notified the recipients by letter. (See Appendix A, Exhibit A-5 for a copy of the letter of acceptance.) The fellow was requested to sign and return the letter of acceptance. In the event of rejections by awardees, the alternate nominee was notified.

UES next notified the university of choice and made arrangements to establish the fellowship through a subcontract between UES and the university. (See Appendix A, Exhibits A-6 through A-8 for copies of the subcontract agreement and forms.) The administration of the subcontracts included the tracking of funding and subcontract payments. All financial arrangements were between UES and the university, with the university taking the responsibility to make stipend payments to the fellow. UES maintained close contact with the university and fellow throughout the program to assure proper payment of the fellowship stipend.

Administration of the subcontracts also required that UES track the progress of each fellow's degree program. At the end of the academic year, the fellow and his/her academic advisor were required to submit to UES a completed certification of academic progress. A certification form was provided by UES to the fellow and his university as an attachment to the subcontract, (See Appendix A, Exhibit A-7).

Certification consisted of a course description, grades received, and a detailed description of research. The certification also contained a signed statement attesting to the completeness and correctness of the information, and a statement attesting to the fellow's satisfactory academic progress toward a Ph.D. degree in the area and discipline stipulated by the fellowship. UES then forwarded a copy of the signed certification to the appropriate laboratories for the attention of the chief scientist. The original is maintained by UES. Copies of signed certifications are included in Appendix D.

Also at the end of each academic year the laboratory was required to formally agree or disagree to continue the fellowship. This was handled through the use of the document entitled Concurrence Form. The concurrence form represents a formal request from the laboratory to AFOSR that the fellowship for the assigned fellow be continued for

the following academic term. This form was provided by UES and had to be signed and dated by both the chief scientist and the mentor. The signed form was returned to UES for processing. Signed and dated concurrence forms are contained in Appendix D. UES informed AFOSR of any rejections received.

The program is evaluated yearly through questionnaires sent to all fellows, laboratory mentors, and laboratory focal points. (Different questionnaires were given to first year and second/third year fellows.) Samples of all questionnaires are included in Sections V and VI where results are also summarized.

Of primary importance and a major factor in the success of the administration of this program are UES's efforts to ensure ease of communication for all who participate or are interested in this program. UES has an 800 number and a dedicated line to accommodate enquiries from people wishing to discuss the program with UES. Calls were received throughout the duration of the program with requests from both graduate students, university professors, and laboratory representatives. The heaviest use of this service was during the period of application with requests from interested applicants. Additionally, status of the award process, concerns or questions concerning program, and information concerning stipend and tuition payments were fielded.

III. STATISTICS ON THE 1989 FELLOWSHIP AWARDS

UES received 571 applications that met the basic requirements of completeness and deadline for filing (January 31, 1989). Based on 1989 AFOSR guidelines and funding, 27 fellowships could be granted. The selection of 27 students from the many eligible candidates was an extremely difficult process, since considerably more than 27 were qualified in both academic accomplishments and area of research.

The table, shown on the following page, gives the breakdown by laboratory of the number of AFOSR fellowships and awarded. The laboratories are listed in alphabetical order.

APPLICATION STATISTICS

Laboratory	Applicants' 1st Choice	Fellowships
Aero Propulsion Laboratory	36	2
Armament Laboratory	19	1
Astronautics Laboratory	22	1
Avionics Laboratory	68	3
Engineering and Services Center	23	1
Flight Dynamics Laboratory	44	2
Frank J. Seiler Research Laboratory	11	1
Geophysics Laboratory	43	3
Harry G. Armstrong Aerospace Medical Research Laboratory	60	3
Human Resources Laboratory	30	1
Materials Laboratory	55	2
Rome Air Development Center	103	4
School of Aerospace Medicine	32	1
Weapons Laboratory	25	2
TOTALS	571	27

IV. PROFILE OF FELLOWS

A list of the 78 recipients of the Laboratory Graduate Fellowships; the university they are attending, their research advisor, and their areas of research; and the affiliated laboratory followed by the fellow's laboratory mentor is shown in the table starting on page 8 of this report.

V. FELLOWS' EVALUATION OF LGFP

Separate evaluation questionnaires were created for both the first year participants as well as those who have been in the program for over a year. The questionnaires were sent to all participants shortly after the start of the fall term. This section provides a summary of the results from the evaluation questionnaires completed by all fellows. The first year participants' results are discussed first; immediately following these conclusions is the section on the results of second year and third year participants. A copy of both questionnaires and a compilation of all answers are included in Appendix B.

5.1 FIRST YEAR PARTICIPANTS

Each of the questions on the first year participant's questionnaire is restated below, followed by summarized answers. Twenty-two first year participants returned their questionnaires.

1. How did you first hear of this program?

Eleven responded that they were informed by a research advisor, faculty member, former participant, or friend. Seven noted that the flyer was distributed by the department or posted on a bulletin board. Only two had seen the ad in a professional journal. Two received information from participating laboratory personnel.

2. What aspect of the program was the most decisive in causing you to apply?

Some answers included more than one aspect. There were six areas noted: (1) 14 mentioned the funding or tuition; (2) Five noted the opportunity to work with experienced research scientists or Air Force laboratory personnel; (3) Three participants included completeness and flexibility of research topics; (4) Two stated the Air Force sponsorship as a plus to the program; (5) One mentioned the prestige of receiving an Air Force fellowship; and (6) One noted the full time three year program as a deciding factor.

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
Charles Adler	1988	Brown	Brown	Physics Nabil Lawandy	Development of E-O Sensor Concepts	Avionics Dr. McManamon
Kevin Atteson	1989	Drexel	Pennsylvania	Computer Science A. K. Joshi	Artificial Intelligence	Avionics Mr. Leonard
Andrew Baker	1987	Harvard	Stanford	Computer & Information Science Michael R. Genesereth	Expert Systems (Vision)	Rome Air Development Center Dr. Fowler
Andrew Bartlett	1987	Massachusetts	Massachusetts	Electrical Engineering C.V. Hollot	Nonlinear Flight Mechanics (Robust Flight Control)	Flight Dynamics Dr. Banda
Brian Bennett	1988	Massachusetts Institute of Technology	Massachusetts Institute of Technology	Materials Science and Engineering Jesus Del Alama	Electro-Optics	Rome Air Development Center Dr. Soref
Kristin Bennett	1989	Puget Sound	Wisconsin-Madison	Computer Science O.L. Mangasarian	Artificial Intelligence	Rome Air Development Center Dr. Fowler
Lawrence Bentley	1988	Hamilton College	Princeton	Civil Engineering George F. Pinder	Subsurface Flow and Transport	Engineering and Service Center Dr. Cornette
Roger Biasca	1988	Massachusetts Institute of Technology	Massachusetts Institute of Technology	Aeronautics-Astronautics Daniel Hastings	Space Physics	Geophysics Mr. Charles Pike/Mr. David Cooke

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
Kliffton Black	1989	Texas/ Arlington	Texas/ Arlington	Engineering Charles Blackwell	Mechanical Engineering Systems & Controls	Flight Dynamics Dr. Banda
David Bossert	1989	Portland	Oregon Graduate Center	Physics Richard DeFreez	Lasers	Weapons Dr. Depatie
Daniel Bower	1988	New York/ Buffalo	New York/ Buffalo	Mechanical & Aerospace Engineering William Roe	Hypersonic Boundary Layer Transion	Flight Dynamics Dr. Stetson
Michael Branicky	1989	Case Western Reserve	Massachusetts Institute of Technology	Electrical Engineering Rodney Brooks	Robotics and Control	Armstrong Aerospace Medical Research Capt. Julian
Leslie Brown	1988	New Mexico	Stanford	Electrical Engineering Dwight Nishimura	Signal Processing	Armstrong Aerospace Medical Research Dr. McKinley
Randy Brown	1989	Georgia Institute of Technology	Washington	Atmospheric Science Christopher Bretherton	Computer Modelling	Geophysics Dr. Chisholm
John Bruno	1988	Arizona	Arizona	Microbiology George B. Olson	Microbiology/ Immunology	School of Aerospace Medicine Maj. Kiel

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
Timothy Bunning	1989	Connecticut	Connecticut	Chemical Engineering Herbert Klei	Chemical Engineering/ Materials	Materials Dr. Crane
William Burkett	1989	Lamar	Texas/Austin	Civil Engineering James O. Jirsa	Civil Engineering/ Structures	Engineering and Services Center Lt. Col. Majka
Joan Carletta	1988	New York/ Buffalo	Cornell	Electrical and Computer Science Frank T. Luk	Microcircuit Testability	Rome Air Development Center Dr. Debany
David Chenault	1989	Vanderbilt	Alabama/ Huntsville	Physics Russell A. Chipman	Optics	Armament Mr. Goldstein
Dmitry Chizhik	1987	Polytechnic	Polytechnic	Electrical Engineering and Computer Science Henry L. Bertoni	Nondestructive Evaluation	Materials Dr. Chimenti
Robert Cramblitt	1989	Delaware	Purdue	Electrical Engineering Jan Allebach	Electrical Engineering	Rome Air Development Center Mr. Costianes
Jennifer Davidson	1987	Mount Holyoke College	Florida	Mathematics Gerhard X. Ritter	Image Algebra	Armament Dr. Coffield
Christopher D'Souza	1988	Illinois	Texas	Aerospace Engineering David G. Hull	Optimal Guidance and Control	Armament Dr. Cloutier

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
Joel DeKock	1988	Iowa State	Wisconsin/ Madison	Metallurgical and Mineral Engineering Eric Hellstrom	Intermetallic Compounds	Materials Dr. Nicholas
Emily Dibble	1987	Smith College	Washington	Psychology Lee Roy Beach	Cognitive Psychology/Basic Skills	Human Resources Dr. Gott
Nancy Dietz	1989	South Dakota State	South Dakota	Physiology & Pharmacology Steven Waller	Neuropharmacology/ Neurochemistry	School of Aerospace Medicine Dr. Werchan
Kenneth Dinndorf	1989	Massachusetts Institute of Technology	Massachusetts Institute of Technology	Physics David Litster	Experimental Physics Condensation/ Space Physics	Astronautics Major Nordley
David Ellsworth	1988	Mankato State	Northwestern	Engineering Science and Applied Mathematics Bernard Matkowsky	Combustion Fluid Dynamics	Aero Propulsion Dr. Roquemore
Kurt Feigl	1989	Yale	Massachusetts Institute of Technology	Earth, Atmospheric and Planetary Science Thomas H. Jordan	Earth Sciences	Geophysics Mr. Lewkowicz

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
James Frantz	1988	Wright State	Michigan	Industrial and Operations Engineering James M. Miler	Industrial and Systems/Human Factors Engineering	Armstrong Aerospace Medical Research Dr. McDaniel
Helen Gainey	1987	Clemson	Clemson	Chemical Engineering Dan D. Edie	Materials Science	Astronautics Dr. Hoffman
Lind Gee	1987	Harvard	Massachusetts Institute of Technology	Earth, Atmospheric and Planetary Science Thomas H. Jordan	Earth Sciences	Geophysics Dr. Cipar
Edward Gellenbeck	1987	Texas	Oregon State	Computer Science Curtis R. Cook	Knowledge Acquisition and Artificial Intelligence	School of Aerospace Medicine Dr. A. Hartman
Charles Gendrich	1989	Michigan State	Michigan State	Mechanical Engineering Robert Falco	Fluid Mechanics	Aero Propulsion Mr.Wennerstrom
John Gierke	1987	Michigan Technlogocial	Michigan Technologcial	Civil Engineering Neil J. Hutzler	Environmental Chemistry	Engineering and Services Center Dr. T.B. Stauffer
Steven Gortsema	1989	Hope College	California Institute of Technology	Aeronautics Dr. W. G. Knauss	Structures, Dynamics	Flight Dynamics Maj. Janiszewski

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
Julie Greenberg	1989	Michigan	Massachusetts Institute of Technology	Electrical & Medical Engineering Martha Gray	Sensory Communication	Armstrong Aerospace Medical Research Mr. McKinley
Jack Hong	1989	Houston	Stanford	Mechanical Engineering Rolf Faste	Computer Integrated Manufacturing	Materials Maj. LeClair
Richard Hornung	1989	Lawrence	Duke	Mathematics Michael Reed	Applied Mathematics	Rome Air Development Center Dr. Evanowski
Michael Hubbard	1987	Michigan State	Northwestern	Chemistry Tobin J. Marks	Nonlinear Optics	Materials Dr. Griffith
Craig Knoblock	1988	Syracuse	Carnegie Mellon	Computer Science Jaime Carbonell	Knowledge Acquisition and Artificial Intelligence	Human Resources Lt. Col. Burns
David Knudsen	1988	Iowa State	Cornell	Electrical Engineering Michael C. Kelley	Ionospheric Physics	Geophysics Dr. Carlson
Kenneth Koedinger	1987	Wisconsin	Carnegie Mellon	Psychology John R. Anderson	Skill Acquisition and Intelligence Tutors	Human Resources Lt. Col. Burns
James Kossin	1988	Clarkson	Colorado State	Atmospheric Sciences William Gray	Atmospheric Sciences	Geophysics Mr. D. Chisholm

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
Richard Kozick	1989	Bucknell	Pennsylvania	Engineering and Applied Sciences Saleem Kassam	Signal Processing	Rome Air Development Center Dr. V. Vannicola
Kang Kwon	1987	Illinois/Urbana	Illinois/Urbana	Electrical and Computer Engineering Chet S. Gardner	Optical/Iono-spheric Physics	Geophysics Dr. Bedo
John Larish	1987	Dayton	Illinois/Urbana	Psychology John M. Flach	Engineering Psychology	Armstrong Aerospace Medical Research Dr. Warren
James Leitch	1987	Minnesota	Colorado	Physics Dana Z. Anderson	Nonlinear Fiber Optics	Frank J. Seiler Research Major White
Alan Levine	1988	Polytechnic Institute of New York	Purdue	Mechanical Engineering Galen King	Dynamic Control in Robotics Systems	Flight Dynamics Dr. Chawla
David Linden	1987	California/ Berkeley	Northwestern	Neuroscience Aryeh Routtenberg	Neurophysiology	School of Aerospace Medicine Mr. Terrian
Kristina Lynch	1989	Washington	New Hampshire	Physics Rodger Arnoldy	Space Physics	Geophysics Mr. Mullen
Vincent McDonell	1988	California/Irvine	California/Irvine	Mechanical Engineering Gary S. Samuelson	Spray and Swirl Stabilized Flames	Aero Propulsion Dr. Roquemore

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
Matilda McVay	1988	Colorado School of Mines	Texas A&M	Aerospace Engineering John Junkins	Space Craft Dynamics Control	Astronautics Dr. Das
Raymond Mills	1989	Virginia Polytechnic Institute & SU	Stanford	Aeronautics & Astronautics Stephen Rock	Aeronautics & Astronautics Dynamics and Control	Astronautics Dr. Das
Brian Milbrath	1988	Murray State	Virginia	Physics Stephen T. Thornton	Antimatter	Astronautics Dr.Corley
Thomas Mullen	1988	Worcester Polytechnic Institute	Harvard	Health Sciences Chuck M. Oman	Medical and Electrical Engineering	School of Aerospace Medicine Dr. Previc
Todd Nichols	1988	Clemson	Colorado	Electrical and Computer Science John M. Dunn	Measurement of Material	Avionics Mr. Calacatera
Carol Novak	1989	Princeton	Carnegie Mellon	Computer Science Steven Shafer	Vision	Armstrong Aerospace Medical Research Lt. Col. Marshak
Gary Petersen	1989	Rensselaer Polytechnic Institute	New Mexico	Physics John McIver	Physical Optics	Frank J. Seiler Research Capt. Motes
Elena Plante	1987	Loyola College	Arizona	Speech and Hearing Linda Swisher	Psychophysiology	Armstrong Aerospace Medical Research Mr. Vikmanis

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
Randall Pope	1987	Clarkson	Clarkson	Electrical and Computer Science Robert Meyer	Distributed Processing	Rome Air Development Center Mr. Metzger
Michael Richard	1988	Massachusetts Institute of Technology	Massachusetts Institute of Technology	Electrical Engineering and Computer Science David J. Epstein	Image Processing	Rome Air Development Center Dr. Senus
Curt Richter	1989	William and Mary	Yale	Applied Physics Robert G. Wheeler	Semiconductor Devices	Avionics Major Soda
Frank Ritter	1988	Illinois/Urbana	Carnegie Mellon	Psychology Allen Newell	Models of Cognitive Processes	Human Resources Dr. Shute
James Seaba	1987	Iowa	Iowa	Mechanical Engineering Lea Der Chen	Combustion Systems	Aero Propulsion Dr. Roquemore
Robert Stamps	1987	Colorado	Colorado	Physics C. E. Patton	Electromagnetic Wave Propagation in Nonlinear Magnetic Materials	Avionics Mr. Huffman
Thomas Spencer	1988	Virginia Polytechnic Institute	Michigan	Nuclear Engineering Ronald M. Gilgenbach	High Power Microwaves	Weapons Dr. Baker

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
William Steedly	1989	Virginia Technology	Ohio State	Electrical Engineering Randolph Moses	Signal Processing	Avionics Mr. Bryant
Sandra Strubinger	1988	Murray State	Mississippi	Chemistry Charles Hussey	Tetrachloroaluminate Melts	Frank J. Seiler Research Dr. Wilkes
David Taff	1987	Colorado School of Mines	Colorado/Denver	Mathematics William Briggs	Scientific Computing	Weapons Capt. Carmona
Holly Taylor	1989	Dartmouth	Stanford	Psychology Barbara Tversky	Psychology Cognitive	Human Resources Dr. Kyllonen
Raul Valdes-Perez	1987	Illinois	Carnegie Mellon	Computer Science Herbert A. Simon	Adaptive Learning Diagnostics	Avionics Mr. Nelson
Richard Volpe	1987	Loyola	Carnegie Mellon	Physics Pradeep Khosla	Robotics	Armstrong Aerospace Medical Research Dr. Repperger
David Wagner	1987	Notre Dame	Stanford	Engineering Sheri Sheppard	Damage Tolerance Characteristics of Advanced Structural Materials	Flight Dynamics Dr. Sendeckyj
Keith Walley	1988	Chicago	Illinois/Urbana	Chemistry Donald Secrest	Tribology	Materials Mr. Haas

PROFILE OF LGFP FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Research Area	Laboratory /Mentor
Albert Wang	1989	Massachusetts Institute of Technology	Massachusetts Institute of Technology	Mechanical Engineering Joseph Smith	Power Systems	Aero Propulsion Dr. Oberly
David Ward	1987	Arizona State	Princeton	Astrophysical Science Stephen Jardin	Plasma Physics	Astronautics Mr. Cobb
Jeffrey Young	1987	Purdue	Purdue	Electrical Engineering Keinosuke Fukunaga	Digital Signal Processing	Rome Air Development Center Mr. Simkins

3. Considering the time between applying and hearing that you were accepted, did this timetable cause you any problems? YES__ NO__ N/A__

Twenty fellows said it was no problem. One participant did not answer this question. The one fellow who indicated a problem, was awarded a late fellowship that came available after the original 25 were awarded.

4. After your acceptance, was the information on the fellowship supplied to you prior to the start of the academic term? YES__ NO__Comments:

The comments indicated that the initial package or acceptance letter was fairly complete.

5. Did you have difficulty in acquiring your fellowship through the university? YES__ NO__ N/A__ Comments:

Only two of the 22 responses indicated difficulty. Problems seemed to be delay by the institution in the processing of paperwork due to lack of clarity or adequate communication about terms. Seven participants noted they did not have adequate information to evaluate this yet.

6. Did you have any difficulty with the administration of the program? If so, briefly describe the problems.

Eighteen participants definitely had "no problems." Three praised the administration for being "very helpful." Many qualified the response by stating none as yet. Of the three who indicated problems, one pointed to the university bureaucracy as causing the problem. Lack of information on orientation visit was also noted.

7. How important is the expense paid pre orientation visit to the laboratory? Not worth expense__ Convenient__ Essential__ N/A__. Briefly describe your visit to the laboratory.

Six felt it was essential and two marked convenient. Most hadn't taken the trip yet. Six indicated they had visited the lab, and their positive experiences included clarification of goals, exposure to facilities, meeting people, and discussing research.

8. Did you participate in summer research at the laboratory? YES__ NO__. Briefly describe your research.

Five participated in summer research. Copies of their final reports are attached to this report in Appendix B.

9. Briefly describe your laboratory mentor's involvement with you and your research. Have you experienced any problems with the laboratory involvement?

Frequent communication and positive support were noted by a few. Most had not had enough time to determine this, but many anticipated no problems or had none so far, even though their involvement may have been only limited.

10. Please furnish below any other comments or suggestions to improve the program in future years.

Comments for improving the program included the following: pay the recipients directly instead of subcontracting with the university; and better information/communication to describe the inter-relationship between the fellow, the laboratory, and the university.

Also, suggested was to have a stipulation attached to the $2000 department grant that the money must be spent on the fellow's research. Other points were that a research budget should be included in the fellowship and that the fellowship be extended one to two years beyond the three year limit.

5.2 SECOND AND THIRD YEAR PARTICIPANTS

1. Have you been able to get answers to all questions that have arisen during your fellowship? YES__ NO__ Comments:

All forty-one responses were positive. Seven praised UES staff for their support and willingness to find answers to their questions.

2. Did you have difficulty in acquiring your stipend through the university? YES__ NO__

Eleven of the forty-one answered affirmatively. Comments indicated the source of the problems was with the university in processing internal paperwork. One mentioned the time needed to process the paperwork between UES and the university. One stated that receiving copies of all correspondence between the

university and UES helped get the processing complete.

3. Did you have any difficulty with the administration of the program? If so, briefly describe the problems.

The only problems mentioned were with the university's administration of the program. Twenty eight fellows stated that they had no problems with the administration of the program.

4. Have you participated in the expense paid pre-orientation visit to the laboratory?

YES__ NO__ Briefly describe your visit to the laboratory.

Twenty nine had visited the lab; thirteen had not. The descriptions of the visit generally included meeting the researchers, discussing the research topics, and visiting the facilities. Most who visited the laboratory presented papers. Several mentioned that this visit led to their participation in the summer research program.

5. Did you participate in summer research at the laboratory?

YES___ NO___. Briefly describe you research.

Only eleven of the 41 had participated in summer research at the laboratories. Most of the comments were technical in nature and can be read in Appendix B.

6. Briefly describe you laboratory mentor's involvement with you and your research. Have you experienced any problems with the laboratory involvement?

The responses ranged from "active" involvement to little direct contact. However, none have had any problems with their mentor and most stated that the mentor has been "helpful."

7. Please furnish below any other comments or suggestions to improve the program in future years.

Eight comments wholly commended the program or stated no suggestions. Various suggestions for improvement were offered in other comments. These are listed below:

(1) Make clear the IRS quidelines for the summer research participants.

(2) Have a toll-free phone number for Ohio.

(3) Provide earlier notification of renewal or non-renewal.

(4) Advertise program more, as most undergraduates seem unaware of it.

(5) Provide copies of the correspondence to fellows which have a direct impact on student.

(6) Make lines on this form large.

5.3 SUMMER RESEARCH FELLOWS

Fifteen LGFP fellows took advantage of the summer research part of the fellowship. Below is a summary of the questionnaires completed by these fellows.

1. Was the offer of research assignment within your field of competency and/or interest? YES___ NO___

   All 15 participating fellows answered this question yes.

2. Was the work challenging? YES_____ NO____. If no, what would have made it so?

   Fourteen fellows said the work was challenging. The one who answered "no" to this question felt the assignment of summer research was too haphazard.

3. Were you relations with your Laboratory Mentor and research colleague satisfactory from a technical point of view? YES_____ NO____ If no, why?

   Again, fourteen stated their relations with the Laboratory Mentor was satisfactory. The one 'No' vote felt the laboratory had a cloudy vision of what they were trying to accomplish.

4. Suggestions for improvement of relationship(s).

   Most comments were favorable with little or not suggestions for improvement. The suggested improvements were; 1) Research projects should be taken seriously. 2) Provisions for continuation of fellow's participation in USAF research beyond the brief summer research period. 3) Goals of the summer research program should be clearly defined and specific to the expected results of effort.

5. Considering the circumstances of a summer program, were you afforded adequate facilities and support? YES_____ NO____.

If no, what did you need and why was it not provided?

Adequate facilities and support was afforded fourteen of the fifteen students. Material requested in January for summer research did not arrive until three weeks after the program began due to procurement difficulties.

6. Considering the calendar "window" of eight to twelve weeks and being limited by varying college and university schedules, please comment on the program length. Did you accomplish: more than___, less than____, about what you expected____?

Four students said they accomplished more than what they had expected, five (5) stated less than, and five (5) said they had accomplished about what they had expected.

7. Were you asked to present seminars on your work and/or your basic expertise? YES____ NO____. Please list number, dates, approximate attendance, length of seminars, title of presentations (use reverse side if necessary).

Five of the 10 participating fellows presented seminars. A list of seminars can be found in Appendix B.

8. Were you asked to participate in regular meetings in our laboratory? YES_____ NO_____. If yes, approximately how often?

Eleven participated in regular meetings at the laboratory. The most common time period was every other week.

9. Other comments concerning any "extra" activities.

Some of the extra activities participated in during the summer research program are listed below.

- Attended UES seminars and a number of research conferences.
- Travel to Eglin AFB, for pilot testing of experimental procedures, experimental materials, and data collection.
- Safety and security seminars conducted; also clean room clean-up detail.

- The UES luncheon and Dr. Burton's "Brown Bag" lunches provided an excellent environment for exchange of scientific ideas.

10. On a scale of A to D, how would you rate this program?
(A high, D low)

Technically challenging	A-11 B-2 C-2 D-
Future research opportunity	A-12 B- C-2 D-1
Professional association	A-11 B-3 C-1 D-
Enhancement of my academic qualifications	A-6 B-8 C-2 D-
Enhancement of my research qualifications	A-10 B-4 C-2 D-
Overall value	A-12 B-1 C-2 D-

B. ADMINISTRATIVE ASPECTS

1. What aspect of the program was the most decisive in causing you to apply?

The freedom of research topics and the opportunity to conduct research in a new environment other than the academic environment were two the reasons for applying for summer research. Also, the facilities available and the expertise present at the laboratory facilities were mentioned.

2. How do you rate the stipend level?
Meager____ Adequate_____ Generous____.

The stipend level was rated 'Meager' by one student, 'Adequate' by nine students and five participants said the stipend was 'Generous.'

3. Please give information on housing: Did you reside in VOQ__, apartment__, other (specify)__? Name and address of apartment complex and manager's name.

One student stayed in the VOQ, 10 participants rented apartments and four specified other arrangements were made for housing.

4. Would you encourage or discourage expansion of the Summer Research Program? Why?

Three of the 15 summer research participants said they would discourage expansion of the Summer Research Program. The reasons stated for this were: (1) Lab staff seems unable to produce much quality work in the limited time of 12 weeks; (2) Expansion of administration workload might cause problems; and (3) More energy should be directed toward making a coherent, intensive program which benefits the student and research facility before expansion should be considered.

The 12 participants that said they would encourage expansion of the summer research program stated several reasons.

- Research association with Air Force personnel.
- Invaluable experience for researchers to expand their research capabilities.
- Great opportunity for students to learn what its like in the 'real world.'

5. Considering the many-faceted aspects of administration of a program of this magnitude, how do you rate the overall conduct of this program? Poor____ Fair____ Good____ Excellent____. Please add any additional comments.

Five of the 15 rated the overall conduct of the program as 'Excellent', eight said 'Good', and two rated the conduct as 'Fair.'

Students comments are listed in Appendix B.

6. Please comment on what, in your opinion, are:

a. Strong points of the program:

A few of the strong points are listed below.

- Provides a great experience to view the Air Force labs.
- Research association with Air Force personnel.
- Establishing contacts.
- Interaction with scientists in research field.
- Use of state-of-the-art equipment.

b. Weak points of the program:

A few of the weak points are listed below.

- Support at the lab is thin.
- Lack of assurance of promised research opportunities.
- Mentor not always available to answer questions.

- Not enough time.
- Students are "self-employed contractor" would prefer to be a summer-hire government employee.

7. On balance, do you feel this has been a fruitful, worthwhile, constructive experience? YES____ NO_____.

All fifteen participants said that the experience was a fruitful, worthwhile, and constructive experience.

8. Other remarks:
   - Will return to the lab in October to complete the research not finished during the summer.
   - Promised data was never provided.
   - Way payments for services were handled (billing every two weeks).
   - Experience with the summer program was very good.
   - Research associates at the Air Force lab were very helpful.
   - Lisa Beljan (of UES) was very helpful.
   - Thank you.
   - This is an extremely great program and learning opportunity.

VI. LABORATORY PARTICIPANTS' EVALUATION OF LGFP

This section provides a summary of the results from the evaluation questionnaires completed by the chief scientist and the mentors at the participating laboratories. A copy of the questionnaire and a compilation of all answers are included in Appendix C.

6.1 LABORATORY FOCAL POINT

An essential part of the success of the USAF-LGFP is the laboratory mentor's interaction with the Graduate Fellow. This section provides a summary of the results from the evaluation questionnaires completed by the focal points at the participating laboratories. A copy of the questionnaire and a compilation of all answers are included in Appendix C.

1. How do you rate the correspondence, verbal and telephone communication and other aspects concerning program administration?
   Excellent__ Good__ Average__ Poor__How could it be improved?

Three of the 12 focal points who submitted completed questionnaires rated the program 'Excellent', eight rated program 'Good', and one rated the program administration 'Poor.' The one focal point mentioned the need for correspondence to be directed through his office and not the chief scientist since they are not located at the same Air Force base.

2. The fellowship selection process is two-fold: academic and research area. Did you have sufficient time to conduct an evaluation of applications?
YES__ NO__ N/A__ Comments:

Ten of the focal points felt they had sufficient time to conduct an evaluation of applications. One felt that they needed more time.

3. Please rate the expense paid orientation visit:
Essential__ Convenient__ Not worth the expense__ N/A_

The expense paid orientation visit was rated as 'Essential' by eight focal points. One rated the visit as 'Convenient' and three had no comment.

4. Did the laboratory/center conduct a general briefing, tour, and/or other formal means of welcome and introduction for the fellow assigned to your organization?
YES__ NO__ N/A_

Eight of the laboratories conducted an formal means of welcome for the LGFP fellow. Three laboratories did not conduct a welcome and one had no comment.

5. Describe the mentors involvement with the fellow. Do you feel there is sufficient involvement between fellow and mentor? If not, what can be done to improve the involvement?
List below are the comments of the focal points concerning the above question.

- Fellows should have to work at sponsoring laboratory at least one quarter during the year.
- Dependent on "Quality" of mentor and availability of time.
- Good involvement - fellows have spent time working at our lab.
- It's important to select a fellow with matching interests.
- All mentors are aware of fellow's research and progress.
- Mentors are encouraged to visit the fellow at his university.

- Require the fellows to work at laboratory every summer.
- Amount of involvement varies with the individual fellow and mentor.

6. Did the fellows assigned to your laboratory take part in the summer research program? YES___ NO___ N/A__ Comments:

According to the focal points only four had fellows who took part in the summer research program and six did not have fellows taking part in the program. There was one without comment.

7. Please furnish any recommendations you may have on improving the LFGP. Following are the recommendations made by the responding focal points.
   - Fellows should be required to work in sponsoring laboratory at least part of the year.
   - Fellows should be required to participate in the summer research program for at least one summer.
   - Ensure a good match of applicant to lab.
   - Could be expanded to four fellows per lab.
   - Get college as well as AF support for program.

8. Please furnish any other comments or suggestions to improve the program in future years.

Other comments or suggestions made by the participating laboratory focal points are listed below.

- Work closer with the lab representative. Chief scientist is located out of state and therefore correspondences must be remailed creating a tremendous loss of time.
- LGFP fellow's advisors should be invited to participate in the SFRP along with the fellow.
- Make the mentor a member of the graduate committee at the university.

6.2 LABORATORY MENTOR

An essential part of the success of the USAF-LGFP is the laboratory mentor's interaction with the Graduate Fellow. Below is a summary of the questionnaire that was completed by 48 mentors.

1. How do you rate the correspondence, verbal and telephone communication and other aspects concerning program administration?

Excellent__ Good__ Average__ Poor__ N/A_ How could it be improved?

Fifteen of the 48 mentors rated the administration as 'Excellent', 18 as 'Good', nine as 'Average', and three said 'Poor.' Again, the mentor have asked for a set of ground rules to tell them what their job as mentor is. The establishment of a reports requirement and formal interchange of achievements and difficulties was also mentioned as a needed improvement.

2. The fellowship selection process is two-fold: academic and research area. Did you have sufficient time to conduct an evaluation of applications?

YES__ NO__ N/A_ Comments:

Twenty-one of the 48 mentors stated they had sufficient time to conduct an evaluation of the applications. Twenty said they did not have sufficient time and seven stated that the question was not applicable.

3. Please rate the expense paid orientation visit:

Essential__ Convenient___ Not worth the expense_ N/A_

The orientation visit was rated 'Essential' by 25 of the mentors, 'Convenient' by 11 and 12 had no comment.

4. Did the laboratory/center conduct a general briefing, tour, and/or other formal means of welcome and introduction for the fellow assigned to your organization?

YES__ NO__ N/A_

Thirty of the laboratories conducted a general briefing, tour, or other formal means of welcome for the LGFP fellow. Nine laboratories did not conduct a formal means of welcome and nine laboratories stated this question was not applicable.

5. Describe your involvement with the fellow. Do you feel there is sufficient involvement between you and the fellow? If not, what can be done to improve the involvement?

A few of the mentor's comments to this question are listed below in condensed form.

- Shared office space, his experimental work was of high interest to me.
- Interacted frequently on research conducted by fellow.

- No sufficient involvement, fellow sees no need to get involved with the laboratory.
- Minimal involvement - appears adequate.
- Assisted in selecting a thesis topic and was involved in discussions of the experimental results.
- There needs to be more involvement, fellow will be invited to visit lab and give a seminar on his thesis work.
- Orientation visit and the summer research program provide adequate opportunities for contacts between the mentor and graduate fellow.
- Informal quarterly progress reports are needed.
- The orientation visit was the key involvement.
- Frequent interactions resulting in papers.
- Involvement has been quite extensive.
- Involvement has just started.
- Require semi-annual or annual visit of fellow to lab and/or lab rep to fellows institution.

6. Did the fellow assigned to your laboratory take part in the summer research program? YES__ NO__ N/A__ Comments:

Eighteen of the mentor's students have participated in the summer research program, 29 have not participated, and one had no comment.

7. Please furnish any recommendations you may have on improving the LGFP. A list of recommendations made by the mentors follows.
   - Make more flexible, with opportunity to take courses at other schools, semester spent in government labs, etc.
   - Stronger ties between University research and Air Force programs.
   - More publicity.
   - Students should be required to take part in the summer research program. The student's advisor might also participate in the Summer Faculty Program.
   - Include periodical travel funds for the Graduate Fellow to visit the host lab.
   - Would like more direct involvement for maximum utility.
   - A social gathering for all fellows early in the summer.

- Increase communication.
- Double the number of fellowships.

8. Please furnish any other comments or suggestions to improve the program in future years.
   - Travel budget for scientific conference attendance, or lab visits.
   - Student and his advisor both participate in the summer research program.
   - Publish annual proceedings of research accomplished by graduate fellows.
   - More involvement of fellows with lab.

VII. SUMMARY

Three fellows have received their P.h.D during the third year of this program. Two of these fellows were awarded the fellowship during the first year of the program (1987). The third student started their fellowship during the second year of the program (1988). Another second year fellow left the program for to accept employment. The students who have left the program are denoted by an asterisk in the "Profile of Fellows" beginning on page 8 of this report.

Copies of the thesis submitted to the LGFP administration office are found in Appendix E.

The contract was modified this year to allow UES to administer the fellowships awarded under the DoD National Defense Science and Engineering Graduate Fellowship Program. The status of these fellowships is discussed in Section VIII.

VIII. DOD FELLOWSHIPS

The administration of the fellowships under the Department of Defense National Defense Science and Engineering Graduate (NDSEG) fellowship program was assigned to UES by contract modification. The selection of the participants was made prior to the assignment to UES. UES was provided a list of students to receive the NDSEG fellowships and tasked with arranging the management of these fellowships.

The fellowships are awarded for a three year period. The level of support provided is a stipend of $14,000 for the first year, $15,000 for the second year, and $16,000 for the third year. The fellowship also provides $6,000 to the university in lieu of tuition and fees and provides $1,000 to the university as an administration fee for the fellowship.

Under the AFOSR sponsored NDSEG fellowships, the students were offered the opportunity to have an association with an Air Force laboratory. The letter of offer for this association is shown in Appendix F. The students were under no obligation to accept this offer. For the students electing to have a laboratory association, a mentor from an Air Force laboratory who is involved in research similar to the research topic of the fellow was assigned to the NDSEG Fellow. Also, the fellows electing to have this association received a $1,000 increase in the yearly stipend (i.e. $15,000 for the first year, $16,000 for the second year, and $17,000 for the third year). In addition these student will be offered the opportunity to spend the summer participating in research at the sponsoring laboratory.

There are a total of 30 students on the program. Accepting the offer of having an association with the laboratory were 24 students. For the students electing to have a laboratory association, a mentor from an Air Force laboratory was assigned to the student. The letter to the students informing of the laboratory assignment and the mentor assignment is shown in Appendix F.

The final step in the start up of the fellowships was the negotiation of a subcontract with each of the universities involved in the program. The forms used for the subcontract under the NDSEG program are shown in Appendix F.

The profile of the NDSEG Fellows is given in the table starting on the next page.

PROFILE OF DoD FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Laboratory /Mentor
Robert Atkins	1989	MIT	MIT	Electrical Eng. Computer Sci.	Avionics Mr. Zelnio
Kevin Beernink	1989	Illinois	Illinois	Computer Eng. James Coleman	Rome Air Development Center Dr. Payne
Gary Bray	1989	Virginia	Virginia	Materials Science Dr. Wilsdorf	Materials Dr. Nicholas
Karen Christie	1989	Tennessee	California	Genetics Dr. Beckendorf	Harry G. Armstrong Aerospace Medical Research Mr. Mattie
Polly Chu	1989	Cooper Union	Cornell	Materials Science Dr. Raj	No Laboratory
Scott Cromar	1989	Brigham Young	Rutgers	Mathematics	No Laboratory
David Darmofal	1989	Michigan	MIT	Aeronautical Eng.	Flight Dyanmics Mr. Harris
Philip Earvolino	1989	Pennsylvania	Northwestern	Materials Sci. Julie Weertman	Materials Dr. Dimuduk

PROFILE OF DoD FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Laboratory /Mentor
Tim Gallagher	1989	Rensselaer	Rensselaer	Mathematics	No Laboratory
Michael Gramer	1989	Minnesota	Stanford	Chemical Eng. Michel Boudart	No Laboratory
Eric Hall	1989	Georgia Instit. of Tech.	Georgia Instit. of Tech.	Aerospace Engineering Dr. Hanagud	Astronautics Dr. Das
Caron Jantzen	1989	Illinois	California Berkeley	Thermosciences Dr. Sawyer	No Laboratory
Cliff Krumvieda	1989	Texas A&M	Cornell	Computer Sci. Dr. Constable	Rome Air Development Center Dr. Fowler
David Landrum	1989	Texas A&M	North Carolina	Mechanical Aerospace Eng. Dr. Dejarnette	Flight Dynamics Mr. Harris
Alan Cobo-Lewis	1989	Miami	Wisconsin	Psychology Dr. Wightman	Human Resources Laboratory Dr. Martin
Marlene Mainland	1989	Georgia Instit.	Georgia Instit.	Mechanical Engineering Dr. Green	Aero Propulsion Dr. Mahefkey
Gary Marcus	1989	Hampshire	MIT	Brain & Cognitive Sci. Dr. Pinker	No Laboratory

PROFILE OF DoD FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Laboratory /Mentor
Michael Mundt	1989	Colorado	Colorado	Aerospace Engineering Dr. Chase	Geophysics Laboratory Mr. Felde
Vincent Natoli	1989	MIT	Illinois	Physics Dr. Martin	Aero Propulsion Dr. Garscadden
Michael Pertel	1989	Chicago	California Ins.	Computer Science	Avionics Capt. Pitarys
Cynthia Platz	1989	Dallas	Wisconsin	Environmental Toxicology Dr. Jefcoate	Engineering & Services Center Dr. Stauffer
Lisa Porter	1989	MIT	Stanford	Applied Physics	Astronautics Dr. Mead
Michael Prime	1989	California	California	Mechancial Engineering	Aero Propulsion Dr. Troha
Darren Rogers	1989	Clemson	Clemson	Ceramic Eng. Dr. Fain	Materials Dr. Hemenger
Kristin Schwind	1989	Clemson	Clemson	Ceramic Eng. Dr. Leigh	Materials Dr. Kerans
Jileen Shobe	1989	Pittsburgh	Missouri	Electrical Engineering Dr. Boone	Aero Propulsion Dr. Garscadden
John Sommerer	1989	Washington	Maryland	Physics Dr. Ott	Weapons Dr. Godfrey

PROFILE OF DoD FELLOWS

Fellows	Award Date	UnderGrad University	University	Department /Advisor	Laboratory /Mentor
Srinivasan Soundararajan	1989	Rensselaer	Stanford	Mechanical Engineering Dr. Kane	Flight Dynamics Mr. Harris
Corinne Wallis	1989	Allegheny	Duke	Physics	Frank J. Seiler Lt. Col. Cook
Skip Williams	1989	Arkansas	Stanford	Chemistry Dr. Zare	Frank J. Seiler Lt. Col. Cook